PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference URCO52BWO	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2005/001950	International filing date *(day/month/year)* 24.02.2005	Priority date *(day/month/year)* 07.04.2004

International Patent Classification (IPC) or national classification and IPC
INV. B01J2/16 B01J8/44 B01J2/00

Applicant
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1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in celectronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
07.11.2005	27.04.2006
Name and mailing address of the international preliminary examining authority: European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840	Authorized officer Cubas Alcaraz, J Telephone No. +49 30 25901-324

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2005/001950

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:

   ☐ international search (under Rules 12.3 and 23.1(b))
   ☐ publication of the international application (under Rule 12.4)
   ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-16 as originally filed

Claims, Numbers

1-10 received on 10.02.2006 with letter of 07.02.2006

Drawings, Sheets

1/6-6/6 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2005/001950

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-10
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-10
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:
D1: WO-A-02100527
D2: WO-A-0236256
D3: JP-A-07265683 (Patent Abstract of Japan and Japanese publication)
D4: US-A-4033555
D5: JP-A-61133132 (Patent Abstracts of Japan, Derwent Abstracts and publication)

INDEPENDENT CLAIM 1

The document D1 does not describe a process for granulating a material using a fluid bed having a circular movement with a horizontal axis. Accordingly, the document D2 is regarded as the closest prior art to the subject-matter of claim 1, and shows (pages 18 and 19, claim 1 and figure 7) a method for granulating a substance using a fluid bed granulator wherein the particles describe a circular movement due to the flow of air having a horizontal axis.

The subject-matter of claim 1 differs from this known fluid bed granulation process in that the fluidizing air is divided into a plurality of fractions having respective flow rates comprised between a minimum flow rate, sufficient to support the fluid bed, and a maximum flow rate fed in another zone of the bed. The subject-matter of claim 1 is new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as to provide a fluid bed granulation process avoiding the production of powder (material not having the required size) and having improved operation.

The only requirement of the present process is to provide a flow of air which is not uniform in the whole section of the granulation bed and which is suitable for producing a circular movement of the particles inside the bed. Thus, it is possible to use a granulator not

having slits for feeding the flow of air, which is a requirement in the closest prior art, but having just holes which are easier to keep clean, improving the operation of the bed. Moreover, the non-uniform fluid bed which is created allows a better wetting of the particles by spraying the granulating liquid in the area where the flow of air is at a maximum rate, improving the granulation of the particles and avoiding that some particles remain with smaller size. Such effects were not described or suggested by the prior art. The subject-matter of claim 1 involves an inventive step Article 33(3) PCT.

INDEPENDENT CLAIM 6

The document D3 is regarded as the closest prior art to the subject-matter of claim 6. This document describes (abstract and figures 2 and 4 of the Japanese publication) a fluid bed granulator wherein the grid for feeding the air has three different zones having different opening density. The difference between this known fluid bed granulator and the subject-matter of claim 6 is the rectangular section of the grid wherein the density or pitch of the openings is increased from a long side of the grid towards the opposite long side. The subject-matter of claim 6 is new (Article 33(2) PCT).

The different opening density in D3 is intended to provide an uniform fluid bed and no circular movement of the particles can be generated with such a construction. The distinguishing features of claim 6 are required in order to perform the process of claim 1. Accordingly, the fluid bed granulator of claim 6 will have the advantages cited for the process of claim 1. Thus, the subject-matter of claim 6 involves an inventive step (Article 33(3) PCT).

INDEPENDENT CLAIM 9

The document D4 does not describe a fluid granulator, because no granulating liquid is supplied to the particles. Thus, the documents D3 and D5 are regarded as the closest prior art to the subject-matter of claim 9. The document D3 describes (figures 7 and 8 of the Japanese publication) a fluid bed granulator comprising a grid wherein the diameters of the openings are gradually increased in one direction. A similar fluid bed granulator is

described in D5. The differences between the subject-matter of claim 9 and the closest prior art are the rectangular section of the grid and the diameters of the openings which are increased from one long side towards the other long side. The subject-matter of claim 9 is new (Article 33(2) PCT).

A circular movement of the particles in the fluid bed is not possible using the fluid bed granulators described in D3 or D5. The distinguishing features of claim 9 are required for performing the process of claim 1. Accordingly, the subject-matter of claim 9 has the same advantages of the process of claim 1, in particular the improved wetting of the particles by placing the liquid spraying element on the wall near to the openings having the maximum diameter. The subject-matter of claim 9 involves an inventive step (Article 33(3) PCT).

DEPENDENT CLAIMS

Claims 2-5, 7, 8 and 10 are dependent on claims 1, 6 and 9 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. Fluid bed granulation process of a predetermined substance comprising the steps of:

- forming, through a fluidification air flow of predetermined flow rate, a fluid bed of granules of said substance to be granulated, fed to it in form of seeds,

- feeding said fluid bed with a continuous flow of a growth substance,

- inducing the formation of a circulatory movement, substantially vortex-shaped, of the said granules of the substance to be granulated in said fluid bed and through at least part of said fluidification air flow,

- maintaining and regulating said circulatory movement through said part of the fluidification air flow,

characterized in that said substantially vortex-shaped circulatory movement has substantially horizontal axis and in that said fluidification air flow is divided into a plurality of fractions having respective flow rates comprised between a minimum value flow rate, sufficient to support the fluid bed, fed at a first zone thereof and a maximum value flow rate, fed in another zone of the same bed, so as to induce and to maintain said circulatory movement, substantially vortex-shaped, with substantially horizontal axis, of the granules of said substance.

2. Granulation process according to claim 1, characterized in that the variation in fluidification air flow rates between said first zone where the flow rate is minimum and the zone spaced out from it where the flow rate is maximum, is of the steps type.

3. Granulation process according to claim 1, characterized in that the variation in fluidification air flow rates between said first zone where the flow rate is minimum and the zone where the flow rate is maximum is substantially gradual and continuous.

4. Granulation process according to claim 1, characterized in that said granules of the substance to be granulated are made to flow from one end of the fluid bed where a flow of seeds of said substance is continuously fed to an opposite end thereof where a flow of finished granulated product is continuously discharged with substantially helical movement.

5. Granulation process according to claim 1, characterized in that finished granulated product obtained in said fluid bed is continuously discharged from a bottom of said fluid bed by gravity.

6. Fluid bed granulator comprising a substantially parallelepiped container (2), equipped with a perforated bottom (3) comprised between two opposite long side walls (4, 5) and opposite short side walls (6, 7), characterized in that said bottom (3) is equipped with holes (11) distributed in said bottom (3) with increasing density or pitch starting from a long side wall (4) of the container (2) towards the opposite long side wall (5) of the container itself.

7. Granulator according to claim 6, characterized in that said holes (11) all have the same diameter or opening area.

8. Granulator according to claim 7, characterized in that in said bottom or grid (3) parallel bands (3a, 3b, 3c), of predetermined width, are provided, in each of which the

respective holes (11) are regularly distributed according to a predetermined "pitch", different from band to band.

9. Fluid bed granulator comprising a substantially parallelepiped container (2), equipped with a perforated bottom (3) comprised between two opposite long side walls (4, 5) and opposite short side walls (6, 7), characterized in that said bottom (3) is equipped with holes (11) uniformly distributed in the bottom itself and having a different diameter or opening area, the diameter of each hole (11) gradually increasing as one approaches a long side wall (5) of said container (2), on which a distributor-supplier (10) of granule-growth substance is preferably supported.

10. Fluid bed granulator comprising a perforated bottom (3) according to any one of claims 6 to 9, characterized in that it comprises a plurality of slits (14), of predetermined width, for the release of finished granules from the container (2), and means for feeding a flow (A) of air or another suitable classification gas into said fluid bed through said slits (14).